

Conservation Districts Working With TMDLs:

Lower Yakima River Basin, Washington

The North Yakima, South Yakima and Benton Conservation Districts in south central Washington have worked with local, state and federal partners to implement the Total Maximum Daily Load (TMDL) plan for the Lower Yakima River Basin. After only three years of a 20-year plan, dramatic improvements have already occurred.

Background -- Yakima River Basin

The Yakima River flows for over two hundred miles through south central Washington and, with its tributaries, drains about 6,150 square miles or 4 million acres. The river originates in Kittitas County from Keechelus and Kachess Lakes on the east side of the Cascade Mountains near Snoqualmie Pass flows southeast, ultimately discharging into the Columbia River near Richland. The Yakima Basin is bounded on the by the Cascade Range, on the north by the Wenatchee Mountains, on the east by the Rattlesnake Hills, and on the south by the Horse Heaven Hills. Elevations in the Basin range from 8,184 feet above mean sea level in the Cascades to 340 feet at the confluence of the Yakima River and the Columbia River. Tributaries include the Cle Elum, Teanaway and Naches Rivers, as well as numerous creeks and irrigation returns.

Nearly 40 percent of the Basin is forested; another 40 percent is rangeland, 15 percent cropland, and the remaining acreage includes other land uses and waterbodies. Average annual precipitation ranges in the Yakima Basin vary widely, from 91 inches annually at Snoqualmie Pass (at the headwaters of the Yakima River in the Cascade Range) to 7.9 inches annually in the city of Yakima. Most of the water in the Yakima River comes from snowmelt, and is caught in a series of reservoirs to ensure sufficient water supply later throughout the irrigation season.



The single largest landowner is the U.S Government with 1.5 million acres or 38 percent of the land area. Much of the forested land is federal land within the Wenatchee National Forest. Other large federal land holdings include the Yak Training Center, the Hanford Nuclear Reservation and the Bureau of Land Management. Other public ownerships (state, county, and local governments) total over 400,000 acres. The Yakama Indian Reservation occupies about 15 percent of the Basin. Lands owned by Native Americans total about 800,000 acres. Private ownership totals nearly 1.7 million acres.

TMDL Project Area -- Lower Yakima River

The Lower Yakima River Watershed is the southern portion of the river basin; its northern boundary is the confluence of the Yakima and Naches Rivers at the city of Yakima. The major land use in the lower basin is agriculture with farms covering about 339,200 acres under irrigation.

With less than 8 inches of rainfall a year (half is from snowmelt), the natural climate of the area is near desert conditions. However, 50% to nearly 100% of the water flowing to the lower basin from the Naches River and upper Yakima River is diverted for irrigation and hydropower generation during the irrigation season. The lower basin slowly recovers some water diverted for irrigation through surface and subsurface returns.

The major crops produced in the lower basin include corn, hay, asparagus, hops, mint, tree fruits and vineyards. Washington State leads the nation in the production of apples, sweet cherries, pears, Concord and Niagara grapes, hops and spearmint.

Water Quality Problems

Historically, the majority of farms have used inefficient rill and furrow irrigation. Excess water was returned to the river through irrigation return drains throughout the lower basin. Returning water contained elevated levels of suspended sediment, pesticides, nutrients and bacteria.

Among the pesticides found in the returned water, the predominant one was DDT, a substance that has been banned since 1973. Animals do not metabolize DDT very rapidly; instead, it is deposited and stored in the fatty tissues. If ingestion continues at a steady rate, DDT builds up within the animal over time. Fish are particularly vulnerable to the effects of DDT. Such high levels of DDT were found in bottom-dwelling fish in the lower basin that the Washington State Health Department issued an advisory against eating them in 1993.

The DDT problems in the Yakima Basin were first documented by the U.S. Geological Survey's National Water Quality Assessment Program studies beginning in the late 1980s. These were the studies that resulted in the Human Health Advisory and made the Lower Yakima a priority for a TMDL Cleanup plan development.

The Washington State Department of Ecology (Ecology) conducted water quality monitoring programs in 1994 and 1995, the results of which determined that DDT represented the key water quality impairments. Because of the expense of measuring DDT, the parameters of suspended sediment and turbidity were used instead to track the progress of the TMDL. The monitoring study found that DDT concentrations were strongly correlated to suspended sediment, which in turn was correlated to turbidity. Several reaches of the Lower Yakima River and several of its tributaries were placed on the state 303(d) list of impaired waters.

During 1995, Ecology and the Yakama Nation joined in a data sharing and cooperative monitoring agreement. Ecology conducted a TMDL study to evaluate controls for suspended sediment, the primary cause of turbidity criteria violations, and a major source of DDT transport during the irrigation season. Based on this evaluation, an overall implementation strategy was established to achieve TMDL goals. Three basic types of needed changes were identified: (1) improving the efficiency of the irrigation delivery systems; (2) improving on-farm management of irrigation water; and, (3) management of farm runoff in agricultural return drains.

Targets were set for total suspended sediment loads and DDT to meet fish and human health criteria. Starting in 1998, target dates were established as follows:

- By 2002 -- compliance with turbidity target in the main stem and the mouths of the tributaries of the Yakima River
- By 2007 -- compliance with targets in the irrigation return drains and tributaries;
- By 2012 -- achieve aquatic biota toxicity level target;
- By 2017 -- DDT human health criteria in fish and water will be met.

Partners

The lower basin covers the jurisdictions of three conservation districts, the North Yakima Conservation District (NYCD), the South Yakima Conservation District (SYCD) and the Benton Conservation District (BCD). NYCD got an early start on their project in 1994, but coordinated their efforts with Ecology and the TMDL process. BCD and SYCD coordinated technical assistance and information and education outreach activities. Benton and South Yakima Districts have a written agreement to share technical assistance.

A major partner in this effort is the Roza-Sunnyside Board of Joint Control. BCD and SYCD tailored their approach to complement and support the Board's efforts to monitor water quality and encourage its growers to use more efficient irrigation systems and best management practices.

The Roza-Sunnyside Board of Joint Control (SBOJC) represents the Roza and Sunnyside Division of Irrigation Districts. Irrigation districts are special purpose units of state government much like conservation districts. The leadership shown by the Board was a key factor in the project's success to date.

The Board of Joint Control was formed in 1996 with the purpose of conserving water and monitoring and improving quality of agricultural return flows in the Lower Yakima River. The growers advised the Board that the best course of action with water quality and endangered species regulations would call for them to be proactive and self-regulating.

With the guidance of the farmers, growers and landowners, the Board developed policies and guidelines to support its water quality program. It can take enforcement action to ensure compliance with total suspended sediment and other TMDL issues, including reducing water to irrigators for non-compliance with the requirements of the water quality program.

The Board encouraged their growers to convert from rill irrigation methods to drip or sprinkler irrigation systems to improve water quality but also to deal effectively with drought conditions from which the area has suffered on several occasions in the past decade.

The Board established an extensive monitoring system that has provided a consistent stream of data and they operate a water quality laboratory that is certified by the Washington Department of Ecology. It also obtained \$10,000,000 from Ecology plus several million dollars of its own funds to offer in low interest loans to growers to convert from rill or furrow irrigation to sprinkler or drip systems.

On the state level, the Department of Ecology provided direction and funding. Ecology also provided one and a half full-time positions to coordinate monitoring, provide technical assistance, and research funding sources and BMPs. The Washington State Conservation Commission also provided funding to the conservation districts to establish a special cost-sharing program for growers to convert to drip or sprinkler irrigation systems. Washington State University-Prosser provided technical assistance.

On the federal level, USDA-Natural Resources Conservation Service (NRCS) provided the majority of staffing and cost-share funds through the Environmental Quality Incentives Program (EQIP) for the on-farm conversions completed since the TMDL began. Other federal partners included USDA Agricultural Research Service (ARS), and the U.S. Geological Survey (USGS), who helped with water quality monitoring.

North Yakima Conservation District

NYCD has been carrying out the Moxee Drain Irrigated Agriculture BMP Implementation Project since 1994. By the time the TMDL process was underway, the NYCD project had already begun but the implementation strategy was the same as those developed as part of TMDL project due to coordination with Ecology. The district workforce consists of three conservation district employees and two NRCS employees.

The Moxee Drain is a 97,680 acre watershed in the Lower Yakima Basin of which 20,000 acres is in irrigated cropland. In that, 95% of the water quality problems were found on 7,500 acres devoted exclusively to the raising of hops, which became the major target area.

The Moxee Drain Project was started with an EPA Section 319 grant and a Centennial Water Quality Grant from Ecology. To provide technical assistance, a water quality monitoring program and an information and education outreach program. Then, by receiving funding from the NRCS P.L. 83-566 Small Watershed Project and substantial EQIP funds, NYCD was able to offer \$2.5 million in cost-sharing which was used exclusively for the conversion of rill irrigated lands to sprinkler or drip systems.

Through consistent leadership, adequate resources and a good relationship with the landowners, the NYCD has succeeded in signing up all the landowners of the 7,500 acre target area to convert from rill to drip irrigation. The \$2.5 million in

share funds provided sufficient incentive to the landowners to fund the remainder of the \$8.7 million of irrigation system conversion costs.

Benton Conservation District

Approximately 40% of the eastern side of the Lower Yakima River Basin is within the jurisdiction of the Benton Conservation District (BCD). The BCD has a district staff of four and NRCS has assigned a staff of two to work with

Within Benton County, the focus was on the Spring Creek and Snipes Creek subwatersheds. Six water quality monitoring sites were established and sampling began in November 1996.

Agricultural mapping also began in late 1996 when NRCS provided a Global Positioning System (GPS) receiver. GPS capability allowed electronic surveys of land use, types of crops, irrigation methods, use of cover crops and an estimate of field slope. Collected data was entered into spreadsheets and Geographic Information System (GIS) programs. Analytical data was presented at public meetings.

BCD applied to Ecology for special funding and has received a total of \$280,000 to implement the continuous water quality monitoring program and for information and education efforts. A grant request to the State Conservation Commission resulted in \$60,000 to date for a cost-share program to help growers convert to more efficient irrigation methods. A pending grant, negotiated by the District, will provide \$100,000, over five years, for additional cost-share to help growers convert to more efficient irrigation methods.

Focus on the TMDL project has provided opportunities for 57 farm conservation plans to be written calling for best management practices (BMPs) for irrigation system conversion and upgrade and soil and water quality improvement. The collective effect of the plans has resulted in annual savings of 310,000 tons of soil from erosion and water savings of 182,000 acre-inches in improved efficiency.

BCD has carried out a comprehensive information and education outreach effort over the last four years. Regular articles about the TMDL project and its progress have appeared in the 13 newsletters issued by the district over the last four years. During that time period, four irrigation workshops were presented for growers. The project has been on the agenda of regular grower's meetings with discussions about erosion control, improved irrigation methods and best management practices.

At the beginning of the TMDL project, the district started an Irrigation Tour as a way to inform the non-agricultural public about irrigated agriculture. There was such an enthusiastic response that has become an annual event ever since. BCD discussed water quality issues this year as a co-sponsor of the "Fish in Schools" program in which over 1,200 salmon raised from eggs in five local schools and released in the Yakima River.

South Yakima Conservation District

Within the jurisdiction of the South Yakima Conservation District (SYCD), the project focused on Sulphur Creek Wasteway, a managed irrigation return drain containing a significant source of contaminants. The Sulphur Creek Wasteway watershed is a tributary to the Lower Yakima and drains 88,000 acres of primarily agricultural land. As with other areas in the Lower Yakima basin, there was extensive use of rill or furrow irrigation, relatively steep slopes, erosive soils and historic over-application of fertilizer resulting in serious water quality problems.

Like Benton, SYCD applied for and received grants from Ecology and the State Conservation Commission for monitoring and providing the special cost-sharing program. Fourteen monitoring stations were established in Sulphur Creek Wasteway from 1997 - 1999.

NRCS designated the Lower Yakima Basin, including Sulphur Creek Wasteway, as a Geographic Priority Area for EQIP that provides incentives for growers to convert to more efficient irrigation methods. The district cost-share program provided a complementary supplement to EQIP. The district also received a Section 319 grant from EPA to evaluate implementation from 2000 - 2001.

Before the TMDL project was started, SYCD had offered a cost-share program focused on BMPs to improve dairy operations. Since 1994, SYCD has been awarded over 2 million dollars in cost-share funds to implement BMPs on several thousand acres that reduce nutrient, bacterial and sediment loading. These improvements along with irrigation water management and nutrient management have had a great effect on the overall TMDL effort.

Progress made over the last several years could attribute improvements in nutrient management and water quality through this program, which helped in the overall TMDL effort. SYCD has a district staff of seven and an NRCS staff of six.

The district's information and education component for the project addressed both growers and the general public. Examples of the outreach effort included:

- A direct mail campaign to every landowner of more than 10 acres in a sub-basin of the Sulphur Creek Wasteway watershed urged them to sign up with EQIP or the Roza-Sunnyside Board of Joint Control's low interest loan program. NRCS staff focused on contacting those landowners who had applied for EQIP funding in the previous year but had not received it.
- Technical and financial assistance was targeted for use by growers in the most critical subwatershed that had received warning letters from the Board of Joint Control regarding the water quality problems.
- A special demonstration project was conducted that converted 24 acres from rill irrigation to a "wheeline" sprinkler system that used polyacrylamide (PAM) in the irrigation water, a substance that bonded with the soil and reduced erosion but allowed infiltration of water.
- The public outreach effort had three goals: increase awareness of the district's role; increase BMP implementation by growers and involve the general public in water quality issues. These messages were conveyed through newspaper and newsletter articles, a Sulphur Creek Wasteway brochure, displays at the Central Washington State Fair and agricultural events, a demonstration at Earth Day and speaking engagements.

Results

The TMDL project is not yet five years old, but considerable improvements in water quality have already been observed. By the concerted efforts of the North Yakima Conservation District, and the Roza-Sunnyside Board of Joint Control working closely with the Benton and South Yakima Conservation Districts, voluntary participation by significant numbers of growers to convert from water-intensive and erosive rill and furrow irrigation methods to sprinkler or drip systems and other BMPs to control erosion have already shown its effects in reductions in sediment loadings, turbidity and nutrient loadings. In all three districts, NRCS provided a total of over \$1.7 million in EQIP cost-share funds from 1997 – 2000. 134 new farm plans were developed.

Although results vary across the Lower Basin, a dramatic improvement has been documented by measuring the median total suspended sediment loading in the Moxee Drain, which had previously averaged 43 tons a day but is now only 4 tons a day, a 90% reduction. At the mouth of Sulphur Creek Wasteway, which contributed 152 tons of sediment per day in 1997 has now dropped to 44 tons a day in 2000, a 71% reduction. Spring Creek in the Benton District averaged about 100 tons of sediment a day in 1997, but is now averaging about 38 tons a day, another 77% reduction.

Their combined efforts to inform, educate and motivate the growers in the Lower Yakima River Basin, with excellent cooperation from partners, were successful in generating a response that has propelled the TMDL project towards meeting its target goals.

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